

Biology 2016 Sem 2 Exam Marking key

Section 1

1.	C	11 C	21 D
2.	C	12 D	22 C
3.	C	13 B	23 B
4.	A	14 B	24 B
5.	C	15 D	25 D
6.	C	16 C	26 C
7.	A	17 C	27 B
8.	D	18 D	28 C
9.	C	19 A	29 B
10.	D	20 A	30 B

Section 2

Question 31

- a. 1st order consumers/herbivores [1]
b. 1 & 2 [1] (16%, 11%, 6%)
as greatest proportion of energy transferred here (NB must refer specifically to these 2 levels, not a general 'Energy lost as heat' comment) [1]
c. phytoplankton have lower biomass than zooplankton [1]
so must reproduce fast to produce many times their weight in a given time [1]
d. Man I [1] fewer transfers, so less E lost [1]
e. Phosphorus cycle requires: Weathering of rocks, P in soil, producers, consumers (enters food chain), decomposers (returning P to soil), fertilisers (increasing P in soil), No P in atmosphere, located in DNA, ATP and plasma membranes [1/2 for each mentioned].
[3]

Question 32

- a. Graph – minus one mark for any omission –
Title; growth of T/P and D/P plants over 10 weeks. Axes –
HEIGHT (cm) TIME (weeks). Clear neat plots; Label the lines OR key. NOT joined to zero. preferably (not critical here)
AVERAGES PREFERRED, but no marks off for plotting all –
time penalty! Plots joined with ruled lines
More than half graph grid used
b TP plants grow taller than DP plants / (over 10 weeks) [2] –
testable statement linking 2 variables
c. height of plant (cm) [1]
d. variety of plant or genetics of plant [1]

- e. 3 of light, temp, fertilizer, amount and frequ of watering, soil, CO₂ availability, measurement time [1] each
NOT "environment" NOT height or type of plant.
f many more plants /incr samp/ incr replicates → more reliable results. [also allow measure biomass rather than height]
g. T/P grow taller than DP – so variety makes a difference to height - as condition were controlled so difference is due to variety

Question 33.

- a. Odonata [1]
b. 1a, 2b, 4b, 5a, 6b, 7a, 8a. [2]
Max 2 for follow on if only 1 error.
c. African stonechat and White-throated robin, [1]
as order and Family the same, so most features in common [1].
Order is different for red-throated Wood rail, so likely to be many features different. [1]
d. Mutualism – ants and fungus
Parasitism – ants and phorid fly
Predator/Prey – adult ants and leaf sap
Commensalism – fungus/plant matter and ants
Intraspecific – ants competing for same resource

Question 34

- a. Biological magnification
b. The substances cannot be broken down by the body. Instead they are stored in the animal's tissues. They accumulate over the lifetime of the animal and remain in its tissues until the animal dies.
c. With wasp numbers reduced, caterpillar numbers would have increased (1/2), and there would be more damage to the thatched roofs. (1/2)
d. With cat numbers reduced, there would be less predation on the village rats. Rat numbers would increase as a result.

Question 35.

- a. Capture–mark–recapture method: answer should explain how rabbits were captured, how they were marked, the recapture and count.
b. No predator to control them, OR plenty of food with no competitors
c. Any of:

- the settlers were accustomed to having rabbits in their fields
- the settlers were accustomed to hunting rabbit and wanted to do that in Australia

- the settlers were accustomed to eating rabbit.

d. Extinction of a plant species could:

- increase soil erosion
- decrease the nutrients available to other species
- cause a decrease in consumer numbers
- increase the number of a competing plant species.

e. An advantage of biological control is that no harmful chemicals are being used.

Disadvantages of biological control include:

- the introduced species may not be specific to the pest species
- an immunity can develop in the pest species.

f. The rabbits developed an immunity to the virus.

Question 36.

a. (1/2 mark each)

Name	Subunit	Example of a cellular function
Carbohydrates	Monosaccharides	Cell walls (cellulose)
Lipids	Triglycerides	Structural component of membranes
Proteins	Amino acids	Metabolism (enzymes)
Nucleic acids	Nucleotide	Controls the functions of the cell

b. Isotonic

- c.(i) Hypertonic (ii) Hypotonic
d. any of: photosynthesis, respiration, digestion, metabolism, protein synthesis
e. Temperature and pH
f. The enzymes helps break down starch (amylases), protein stains (protease) and fatty or greasy stains (lipases)
g. denatures

Question 37.

- a. stoma or stomata or stomatal pore [1]
b. to allow gases (CO₂ & O₂) to enter and leave the leaf [1]
and allow water vapour to leave the leaf [1]
c. palisade mesophyll [1]
d. to capture light and produce glucose by photosynthesis [1]
e. a vein / vascular bundle / xylem & phloem [1]

f. Vascular bundles transport water and nutrients into the leaf [1] and take glucose produced out of the leaf [1]

g. word equation not chemical

carbon dioxide + water → glucose + oxygen + water

h. [4]

Name of stage	Site within a chloroplast
Light dependent	Thylakoid membranes
Light independent	Stroma

i. The rate of photosynthesis could be increased by: *any two*

- increasing the amount of sunlight available
- ensuring that each plant had plenty of water available
- artificially supplying carbon dioxide into the greenhouse
- ensuring the temperature is maintained at a warm level, to assist enzyme function. [2]

Question 38

a. i. 2 atria and 1 ventricle (amphibian) or 3 chambered heart

ii. 1 atrium, 1 ventricle (Fish) or 2 chambered heart

NB only heart structure asked for.

b. double circulation means higher pressure [1] so faster circuit times [1] 2 ventricles separates oxygenated from de-oxygenated blood [1] so higher/more efficient oxygenation of blood[1]

c

- moist, so gases dissolve
- thin, so short diffusion distance
- large S/A so greater area for diffusion
- hi conc gradient, so faster diffusion OR ventilated surface → hi conc gradient OR good blood supply → hi conc gradient

d. protection from damage [1] drying out [1]

e. low [O₂] in water of 1%[1], so need hi S/A from gill lamellae [1] and counter current gas exchange (CCGE) mechanism[1] so maximizes conc gradient as blood always meets water of higher O₂ conc [1] NB only 3 needed; must have CCGE.

Extended answers

Question 39a

[½ ea to 10 marks]-must show a journey in sequence
 Capillaries- thin-walled small diameter, allow diffusion-; allows oxygen to diffuse into tissue- then into veins- thin-walled little muscle, larger diameter- to vena cava main vein of body- to right side of heart into right atrium- into right ventricle- to pulmonary artery- to lungs- to capillaries of alveoli- collects oxygen by diffusion again- into pulmonary vein- to left atrium- to left ventricle- to aorta main artery- arteries- large diam muscle-walled- back to capillary in leg to release oxygen again.

Question 39b

Transcription - Any five of;

- DNA unwinds
- RNA polymerase
- attaches to DNA at a specific region/ promoter region/ 5'
- DNA code is used as a template
- only one strand of DNA is transcribed (antisense strand)
- free nucleotides used to form mRNA
- mRNA forms complementary strand to DNA
- difference is uracil instead of thymine attached to adenine
- transcription stops at terminator sequence on DNA strand
- RNA polymerase/enzyme then detaches from DNA/releases mRNA
- mRNA transported/moves (from nucleus) to cytoplasm

Translation - Any five of;

- mRNA transported/moves (from nucleus) to cytoplasm (if not awarded above)
 - mRNA binds to ribosome
 - Bases in groups of 3 per codon • start codon (mRNA)
 - tRNA recognizes codon on mRNA
 - tRNA contains an anti-codon
 - tRNA binds to site on ribosome/P site
 - and brings amino acid with it
 - a peptide bond forms between the amino acids
 - tRNA is released to continue the process
 - amino acid chain forms a polypeptide/ protein
- [½ each up to 5 marks] – must give plant examples

Question 39c

	Photosynthesis	Respiration
Reactants	CO ₂ , water	O ₂ , glucose
Products	O ₂ , glucose	CO ₂ , water
Energy from/to	From light, needed	Released to ATP for cell processes
structures	chloroplast	mitochondria
Diagram includes	Green, small contain discs, many in plant cell.	Double membrane 'zig-zag' shape.

1 mark per box

Question 40a.

Description	Marks
Description –1 mark each (specific name of the diversity type not required) <ul style="list-style-type: none"> • Full range of genetic diversity/genes/alleles present in the gene pool/ all existing subspecies or genetically distinct populations of a species • The total of all existing species (in a given area/with prevention of any extinctions occurring because of human activity) • The full range of identified ecosystem types (in a given area/in sufficient health and size) 	1–3
Importance – 1 mark per dot point – at least 2 per level, 3 for any one level <p>Genetic</p> <ul style="list-style-type: none"> • Large range of genes allows species to adapt to change/undergo natural selection • Genes may become useful in the future for recombinant DNA technology • Captive breeding programs/breeding in natural populations depend on genetic diversity to allow healthy outbreeding <p>Species</p> <ul style="list-style-type: none"> • Ecosystems are complex and all species have a niche/loss of any species can upset a whole ecosystem food web • Species surviving in one area can be used to repopulate other areas • Particular species may benefit humans in the future eg. Medicine <p>Ecosystems</p> <ul style="list-style-type: none"> • Must have habitats for full range of diversity to live naturally • Many ecosystems have not been fully studied/inventoried-need to preserve these areas so this can be done • There is great commercial and spiritual value in preserving these areas. Eg tourism, resources, recreation 	1–7
Total	10

Question 40b

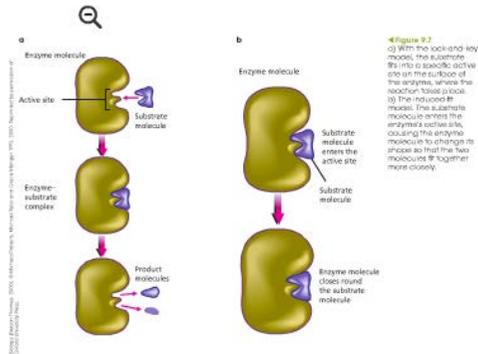
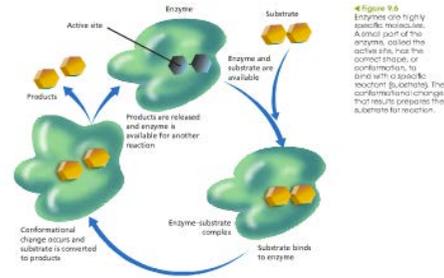
Description	Marks
All the organisms in an area and their interactions with each other	1
And their interactions with the physical/abiotic environment	1
Name one realistic terrestrial ecosystem under threat (e.g. jarrah forest, coastal sand dune, rain forest, wheat belt woodland)	1
Name one realistic aquatic ecosystem under threat (e.g. Swan River, Cockburn Sound, seagrass beds, freshwater lakes, coral reefs)	1
Terrestrial	
Identify a specific problem and relate to human activity (e.g. logging, dieback, feral/pet predation, clearing of habitat, mining)	1
Identify and describe a realistic strategy (e.g. alternatives to native timber, reforestation, quarantine, baiting of ferals, legal protection of natural habitat)	1-2
Aquatic	
Identify a specific problem and relate to human activity (e.g. over harvesting, specific type of pollution, eutrophication, rising/falling water tables)	1
Identify and describe a realistic strategy (e.g. legal control of harvesting, aeration of water bodies, removal of excess algal growth, revegetation of surrounding areas)	1-2
Total 11	

Question 40c

- Properties of enzymes [1] – protein, organic catalysts, highly specific, active site, specific shape to bind with a specific shaped substrate, reusable, unchanged at end of rxn
- Actions of enzymes [1] speed up and control reactions / biochemical processes in living things, catabolic, anabolic

Models

- Explain the lock and key & Induced fit models (labelled diagrams) [6]
- Lock & Key – enzyme shape is fixed
- Induced fit – enzyme shape is not fixed
- Use $E + S \rightarrow ESC \rightarrow ESP \rightarrow E + Ps$
- Enzyme unchanged and reusable



- Any 2 below (2)
- Temp and pH can alter the rate of reaction by either denaturing enzyme or reaching optimum range.
- As temp increases towards the optimum range the rate of rxn will increase / random collisions increase until enzyme denatures
- Low temp = low enzyme activity
- Temp causes the weaker bonds (H and ionic) to break, active sites change shape, less complementary to substrate, less likely to catalyse rxn